DOCUMENT RESUME

ED 301 429 SE 050 148

TITLE Mathematics Assessment Program 1987; Grade 12-301. (With Manual and Scoring Key).
INSTITUTION Manitoba Dept. of Education, Winnipeg. Curriculum Development Branch.
REPORT NO 22672
PUB DATE Jun 87
NOTE 44p.
PUB TYPE Tests/Evaluation Instruments (160) -- Guides - Classroom Use - Materials (For Learner) (051) -- Guides - Classroom Use - Guides (For Teachers) (052)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Achievement Tests; Foreign Countries; Grade 12; High Schools; Mathematical Concepts; *Mathematics Achievement; Mathematics Education; Mathematics Skills; *Mathematics Tests; *Secondary School Mathematics; *Test Items; Test Manuals
IDENTIFIERS Manitoba (Winnipeg)

ABSTRACT

This is a part of the Manitoba Mathematics Assessment Program 1987. Actual testing material and the manual for grade 12 are provided. The test (38 items) requires 75 minutes to be taken. Part A (30 items) has core items for every student and Part B has optional items on which students write only two sections (8 items) from those designated by the teachers. The manual describes general testing instructions, administration, scoring method and key, and format for recording the final test scores. (YP)

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№ 22672

MATHEMATICS ASSESSMENT PROGRAM 1987

CURRICULUM DEVELOPMENT AND IMPLEMENTATION BRANCH

GRADE 12-301

U.S. DEPARTMENT OF EDUCATION
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JUNE, 1987

Manitoba Education

SE 050 148

GENERAL INSTRUCTIONS

THIS TEST CONSISTS OF TWO PARTS:

PART A - CORE - 30 ITEMS, WRITTEN BY EVERYONE

PART B - OPTIONS - IN THIS PART YOU WILL WRITE ONLY THOSE **TWO** OPTIONS DESIGNATED BY YOUR TEACHER. EACH OPTION SECTION CONTAINS 4 ITEMS.

ALL QUESTIONS ARE TO BE ANSWERED ON THE ANSWER SHEETS PROVIDED. CALCULATORS MAY BE USED. THERE IS AMPLE SPACE IN THE TEST BOOKLET FOR SCRATCH WORK.

BE SURE TO READ THE INSTRUCTIONS CAREFULLY FOR EACH SECTION AND TO USE THE APPROPRIATE PART OF THE ANSWER SHEET.

DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

PART A

BEGIN WITH SPACE NUMBER 1 ON YOUR ANSWER SHEET.

1 The following table suggests the distribution of take-home pay for various family expenses.

Shelter	25%
Food	30%
Transportation	12%
Clothing	10%
Health and Personal Care	8%
Recreation	6%
Insurance	5%
Savings	4%
TOTAL	100%

The Perin family's take-home pay is $40 000 for 1986. The combined dollar amount suggested for food and recreation is

A) $ 7 200
B) $12 400
C) $14 000
D) $14 400
E) $36 000

2 The Health Department recommends that a family spends no more than 30% of its annual salary on housing. Daisy earns $15 000 a year at her present job. The most she should spend on housing for each month is

A) $ 312.50
B) $ 375.00
C) $ 450.00
D) $ 500.00
E) $4 500.00

3 Cablevision rental bills usually are based on a three-month period. However, John likes to budget his finances monthly. If his most recent bill is $23.58, his monthly expense for cablevision is

A) $ 7.86
B) $ 8.46
C) $10.86
D) $11.79
E) $70.74

4 Randy wants to organize his finances into a monthly budget but he gets paid on a weekly basis. What would his monthly salary be if his weekly salary is $250?

A) $ 62.50
B) $ 750.00
C) $1 000.00
D) $1 041.66
E) $1 083.33

5 Joe's total income noted on his income tax return is $32 891. Find his taxable income if his deductions are $556 and $3 528.

A) $ 4 084
B) $28 807
C) $29 919
D) $32 891
E) $36 975

6 Martha Thompson has a house assessed at $15 600. The local tax rate increased 12 mills from last year. How much will her property taxes increase?

A) $156.00
B) $187.20
C) $198.00
D) $1 872.00
E) $1 980.00

7 Use the table to answer the following question:

What is the annual payment on a term insurance policy of $50 000 for 15 years issued at age 18?

PREMIUM RATE TABLE
LIFE INSURANCE: ANNUAL PREMIUMS
(PER $1000 WORTH OF INSURANCE)

AGE AT ISSUE	TERM		WHOLE LIFE (TO AGE 85)	LIMITED-PAYMENT LIFE (TO AGE 65)	ENDOWMENT	
	10 YEARS	15 YEARS			TO AGE 60	TO AGE 65
15	$3.58	$4.08	$11.14	$11.82	$14.35	$14.98
16	3.64	4.10	11.48	12.21	14.85	15.86
17	3.70	4.13	11.82	12.60	15.34	16.74
18	3.76	4.15	12.16	12.99	15.84	17.62
19	3.83	4.17	12.50	13.38	16.34	18.50
20	3.90	4.20	12.84	13.77	16.84	19.37
21	3.96	4.22	13.25	14.26	17.48	20.17
22	4.02	4.24	13.66	14.75	18.13	20.97
23	4.09	4.26	14.07	15.24	18.78	21.77
24	4.16	4.28	14.48	15.73	19.45	22.57

A) $188.00
B) $206.50
C) $207.50
D) $208.50
E) $225.50

8 The most important factors affecting the cost of automobile insurance are

A) the size of the car, how far it is driven each year, and the deductible.
B) its value, its use, where the owner lives, and the deductible.
C) where the car was purchased, the year of the car, the deductible, and distance the owner lives from work.
D) the colour of the car, the deductible and the number of accidents in which the car has been involved.
E) the kind of tires, the age of the car, the make of the car, and the deductible.

9 The table below represents a schedule of mortgage payments calculated on the decreasing payments plan. The mortgage rate is 12%. Monthly payments of $400 plus interest on the unpaid balance are made by the owner. What is the value of x in the table below?

Date	Regular Payment			Unpaid Balance	Owner's Equity
	Principal	Interest	Total		
Jan 1				50 000	5 000
Feb 1	400	500	900	49 600	5 400
Mar 1	400	x			

A) $ 496
B) $ 500
C) $ 508
D) $ 900
E) $5 800

(10) Use the table below to determine the monthly payment required to amortize a mortgage of $55 000 for 20 years at 11%.

A) $220.00
B) $302.50
C) $558.80
D) $567.60
E) $605.00

MONTHLY PAYMENT REQUIRED TO AMORTIZE A $1000 MORTGAGE

9½%	9¾%	10%	10¼%	10½%	10¾%	11%	11¼%	11½%	11¾%	12%	n
87.60	87.72	87.83	87.94	88.05	88.16	88.27	88.38	88.50	88.61	88.72	1
45.84	45.95	46.06	46.17	46.28	46.39	46.50	46.61	46.72	46.83	46.94	2
31.95	32.06	32.18	32.29	32.40	32.52	32.63	32.74	32.85	32.97	33.08	3
25.04	25.16	25.27	25.39	25.50	25.62	25.73	25.85	25.96	26.08	26.20	4
20.92	21.04	21.15	21.27	21.39	21.51	21.63	21.74	21.86	21.98	22.10	5
18.19	18.31	18.43	18.55	18.67	18.79	18.91	19.04	19.16	19.28	19.40	6
16.26	16.38	16.50	16.63	16.75	16.87	17.00	17.12	17.25	17.38	17.50	7
14.82	14.95	15.07	15.20	15.33	15.45	15.58	15.71	15.84	15.97	16.10	8
13.72	13.85	13.97	14.10	14.23	14.37	14.50	14.63	14.76	14.89	15.03	9
12.84	12.98	13.11	13.24	13.37	13.51	13.64	13.78	13.91	14.05	14.19	10
12.14	12.28	12.41	12.55	12.68	12.82	12.96	13.09	13.23	13.37	13.51	11
11.56	11.70	11.84	11.98	12.12	12.26	12.40	12.54	12.68	12.82	12.96	12
11.08	11.22	11.36	11.51	11.65	11.79	11.93	12.08	12.22	12.37	12.51	13
10.68	10.82	10.97	11.11	11.25	11.40	11.55	11.69	11.84	11.99	12.14	14
10.34	10.48	10.63	10.77	10.92	11.07	11.22	11.37	11.52	11.67	11.82	15
10.04	10.19	10.34	10.49	10.64	10.79	10.94	11.09	11.24	11.40	11.55	16
9.79	9.94	10.09	10.24	10.39	10.55	10.70	10.86	11.01	11.17	11.32	17
9.57	9.72	9.87	10.03	10.18	10.34	10.49	10.65	10.81	10.97	11.13	18
9.38	9.53	9.69	9.84	10.00	10.16	10.32	10.48	10.64	10.80	10.96	19
9.21	9.36	9.52	9.68	9.84	10.00	10.16	10.32	10.49	10.65	10.81	20
9.06	9.22	9.38	9.54	9.70	9.86	10.03	10.19	10.36	10.52	10.69	21
8.93	9.09	9.25	9.41	9.58	9.74	9.91	10.07	10.24	10.41	10.58	22
8.81	8.97	9.14	9.30	9.47	9.64	9.80	9.97	10.14	10.31	10.48	23
8.71	8.87	9.04	9.21	9.37	9.54	9.71	9.88	10.05	10.22	10.40	24
8.62	8.78	8.95	9.12	9.29	9.46	9.63	9.80	9.98	10.15	10.32	25
8.53	8.70	8.87	9.04	9.21	9.39	9.56	9.73	9.91	10.08	10.26	26
8.46	8.63	8.80	8.97	9.15	9.32	9.50	9.67	9.85	10.02	10.20	27
8.39	8.57	8.74	8.91	9.09	9.26	9.44	9.62	9.79	9.97	10.15	28
8.28	8.46	8.63	8.81	8.99	9.17	9.34	9.52	9.71	9.80	10.07	30
8.08	8.26	8.45	8.63	8.81	9.00	9.18	9.37	9.56	9.74	9.93	35
9½%	9¾%	10%	10¼%	10½%	10¾%	11%	11¼%	11½%	11¾%	12%	n

(11) Simplify completely

$$(7x - 5)(3x + 2) - 3(4x - 6)$$

A) $21x^2 - 12x - 28$

B) $21x^2 - 13x - 28$

C) $21x^2 - 13x + 28$

D) $21x^2 - 13x + 8$

E) $21x^2 + 17x + 8$

(12) Simplify completely

$$\frac{(2)^3(-5)^{-2}}{(10)^{-2}}$$

A) 1
B) 2
C) 32
D) 50
E) 10 000

(13) Simplify completely

$$\frac{5x^2y - 15x^3y^3 + 25xy^2}{5xy}$$

A) $xy - 3x^2y^2 + 5xy$

B) $-xy + 3x^2y^2 - 5xy$

C) $x - 3x^2y^2 + 5y$

D) $x - 15x^3y^3 + 25xy^2$

E) $x^2y - 3x^2y^2 + 5xy^2$

14 In scientific notation the number 0.00132 is

A) 132×10^{5}

B) 132×10^{-5}

C) 1.32×10^{5}

D) 1.32×10^{3}

E) 1.32×10^{-3}

15 Solve for x in the equation

$$5x - 3(7x + 6) = 2x - 1$$

A) $-\frac{18}{17}$

B) $-\frac{17}{18}$

C) $\frac{17}{18}$

D) $\frac{19}{18}$

E) $-\frac{19}{18}$

16 Decide which equation is the correct one to solve the following word problem.

Bert, the house painter charges for his labour and paint. His rate is $15.75 per hour and he needs 30 gallons of paint at $22.95 a gallon. He estimates that a house takes about 8 days (64 hrs) to paint. What will he charge his customer?

A) cost = 15.75 x 30 + 22.95 x 8
B) cost = 15.75 x 30 + 22.95 x 64
C) cost = 15.75 x 8 + 22.95 x 30
D) cost = 15.75 x 64 + 22.95 x 30
E) cost = 15.75 x 64 + 22.95 x 8

17 Solve the system of equations for x and y.

$$3x + 14y = 22$$
$$x - 3y = 15$$

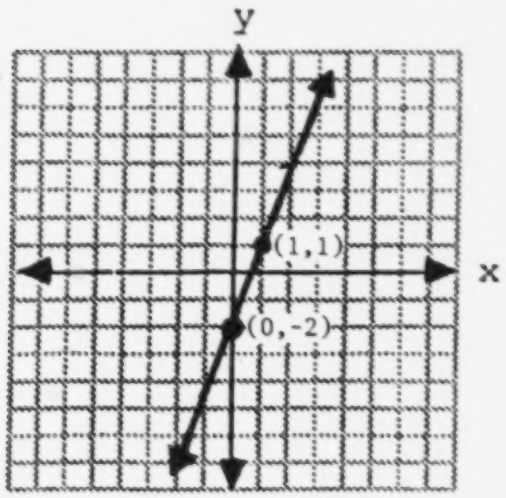
A) x = 12, y = 1
B) x = 18, y = -1
C) x = 3, y = 1
D) x = 19, y = -1
E) x = 12, y = -1

18 Cecil bought 15 kilograms of oranges and grapefruit to support the local high school band. The oranges cost $1.50 per kg and the grapefruit $1.40 per kg. If he paid $21.80 all together, how many kilograms of grapefruit did he buy?

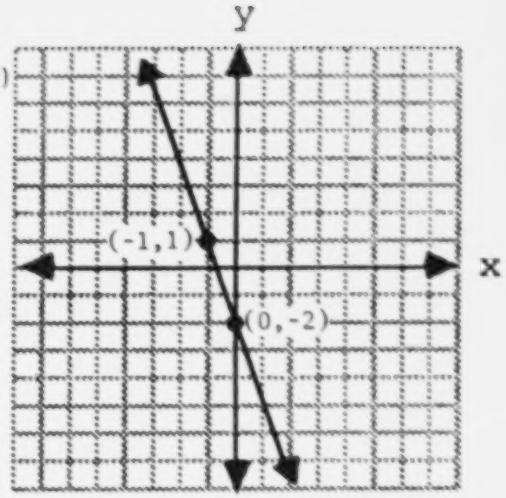
A) 5
B) 6
C) 7
D) 8
E) 9

19 Which graph represents the equation $y = 3x - 2$?

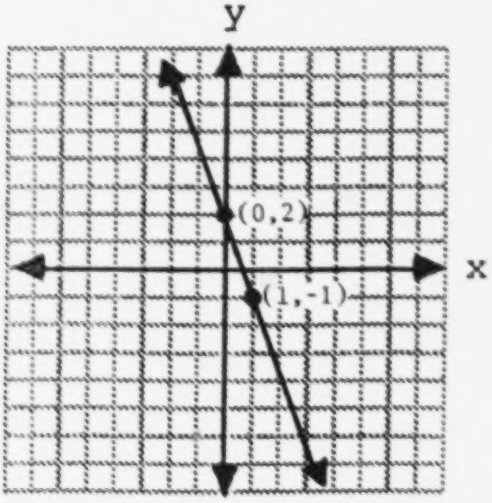
A)



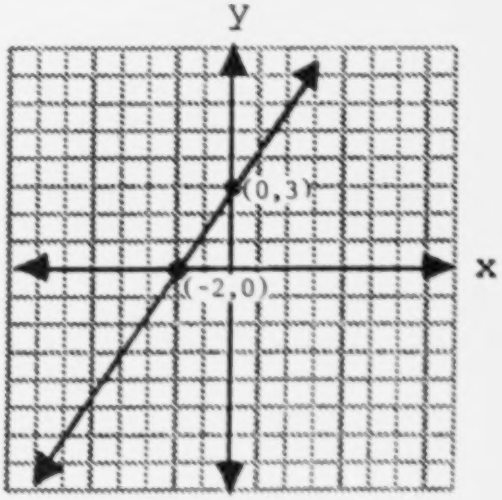
B)



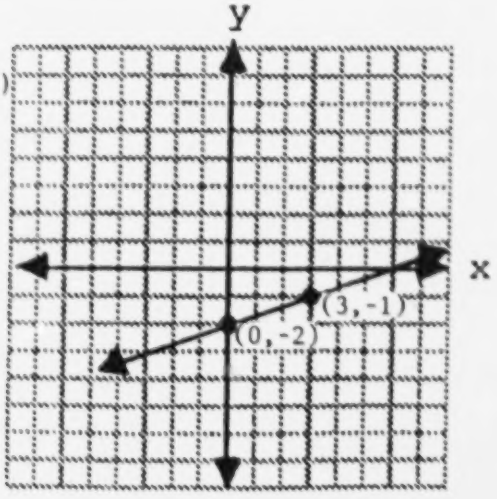
C)



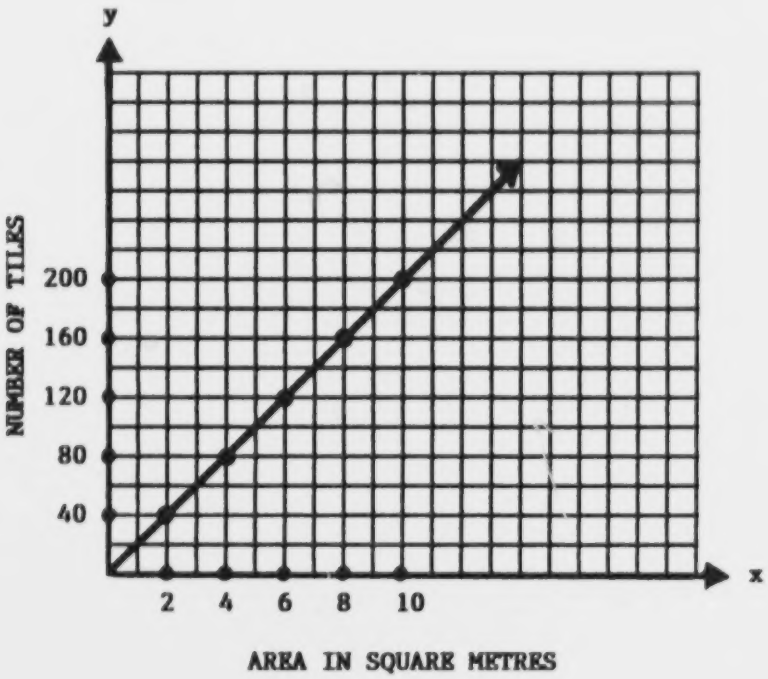
D)



E)



20 The number of tiles needed for the walls of a bathroom is directly proportional to the area to be covered as shown in the graph below. How many tiles are required for 5 square metres of wall area?



A) 80
B) 90
C) 100
D) 120
E) 200

21 The cost of carpet cleaning involves a basic price plus a variable cost depending on the size of the carpets. If 40 square metres cost $44.80 and 80 square metres cost $49.60 find the constant of variation.

A) 0.12
B) 0.20
C) 10
D) 40
E) 48

22 Two variables x and y vary inversely and x = 5 when y = 20. Find y when x is 25.

A) 2500

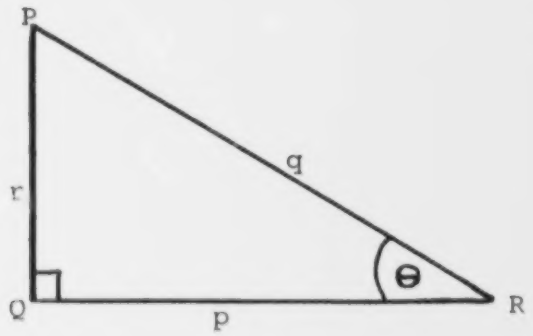
B) 100

C) $\frac{25}{4}$

D) 4

E) $\frac{1}{4}$

(23)



Given triangle PQR, then by definition, sin θ is

A) $\frac{r}{p}$

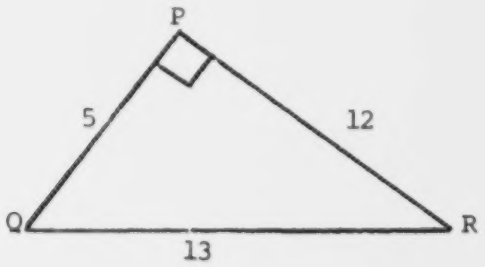
B) $\frac{p}{r}$

C) $\frac{q}{p}$

D) $\frac{r}{q}$

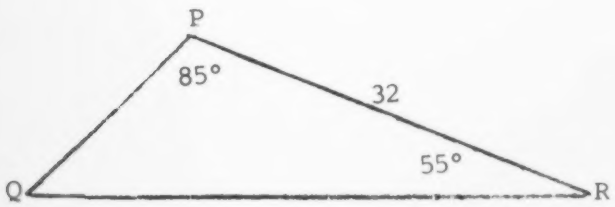
E) $\frac{p}{q}$

(24) In triangle PQR, find the size of angle Q to the nearest degree.



A) 21°
B) 23°
C) 25°
D) 65°
E) 67°

25 In triangle PQR, find the length of QR to the nearest whole number.



A) 4
B) 20
C) 21
D) 50
E) 281

26 A triangular-shaped field has two sides 50 m and 60 m long, and the angle between these sides is 96°. How long is the third side, to the nearest whole number?

A) 57 m
B) 74 m
C) 80 m
D) 82 m
E) 133 m

27 The numbers of words in each sentence in a paragraph selected from a recent novel are listed below. Find the mean.

13, 19, 22, 23, 9, 29, 37, 11, 8, 29

A) 18
B) 19
C) 20
D) 21
E) 29

28 Find the median number of annual inches of precipitation for the data listed below.

15, 28, 11, 20, 59, 27, 13, 11, 11

A) 11
B) 15
C) 20
D) 22
E) 27

A set of data is grouped into the frequency distribution below. Use the table to answer questions 29 and 30.

Class	Class Midpoint x	Frequency f	xf	Cumulative Frequency
100 - 150	125	3	375	3
150 - 200	175	11	1925	14
200 - 250	225	9	2025	23
250 - 300	275	4	1100	27
300 - 350	325	6	1950	33
	Total	33	7375	

29 What is the mode for the data?

A) 175
B) 200
C) 216.7
D) 223.5
E) 225

30 Calculate the median.

A) 175
B) 200
C) 216.7
D) 223.5
E) 225

END OF PART A - GO TO PART B

IN PART B DO ONLY THE TWO SECTIONS INDICATED BY YOUR TEACHER.

	OPTION	PAGE	ITEMS
I.	ANNUITIES	18	31-34
II.	DEPRECIATION AND DISTRIBUTION OF OVERHEAD COSTS.	21	41-44
III.	DIGITAL LOGIC.	23	51-54
IV.	INVESTMENTS.	26	61-64
V.	INTERPRETATION OF GRAPHS	28	71-74
VI.	QUADRATIC EQUATIONS.	31	81-84
VII.	PERMUTATIONS AND COMBINATIONS. .	33	91-94
VIII.	STATISTICS	34	101-104

EACH OPTION SECTION BEGINS ON A NEW PAGE.

READ INSTRUCTIONS CAREFULLY.

BEGIN YOUR FIRST OPTION.

GO TO PART B.

OPTION I - FORMULAS

Compound amount	$A = P(1 + r)^n$
Present value or principal of a compound amount	$P = \frac{A}{(1 + r)^n}$
Amount of an ordinary simple annuity	$S_n = R\frac{(1 + i)^n - 1}{i}$
Present value of an ordinary simple annuity	$A_n = R\frac{1 - (1 + i)^{-n}}{i}$
Amount of an ordinary complex annuity	$S_n = R\frac{(1 + i)^{nc} - 1}{(1 + i)^c - 1}$
Present value of an ordinary complex annuity	$A_n = R\frac{1 - (1 + i)^{-nc}}{(1 + i)^c - 1}$
Mortgage balance after n payments	$B_n = P(1 + r_m)^n - A\frac{(1 + r_m)^n - 1}{r_m}$

OPTION I - ANNUITIES

BEGIN THIS OPTION IN SPACE NUMBER 31 ON YOUR ANSWER SHEET.

NOTE FORMULAS ON PRECEDING PAGE.

(31) Bill decides to invest the $3 500 he earned from his summer job into a savings plan that pays 9% compounded semi-annually. How much will he have after 5 years? Find your answer to the nearest dollar.

A) $3 815
B) $5 385
C) $5 435
D) $5 591
E) $8 286

(32) Calculate the present value required to develop an amount of $20 000 over a 20 year period at 10% compounded annually. Find your answer to the nearest dollar.

A) $1 346
B) $2 973
C) $3 230
D) $7 711
E) $9 091

(33) If you had $1 000 and you invested it in a savings plan at 9% interest compounded annually, about how long would it take before you had twice as much money as you started with?

A) 6 years
B) 7 years
C) 8 years
D) 10 years
E) 12 years

Option I (Cont'd.)

34 Jane wants to buy a house 5 years from now with a down payment of $6 000. How much should she put away now, compounded quarterly at 12%, in order to have her down payment in 5 years?

A) $ 622.00
B) $3 232.05
C) $3 322.05
D) $3 404.56
E) $5 175.65

END OF OPTION I

OPTION II - DEPRECIATION AND DISTRIBUTION OF OVERHEAD COSTS

BEGIN THIS OPTION IN SPACE NUMBER 41 ON YOUR ANSWER SHEET.

41 The cost of a furnace to heat Joe's new cabinet-making factory is $1 100. He estimates that its disposal value after 12 years is $50. What is the annual rate of depreciation using the straight line method?

A) 6%
B) 7%
C) 8%
D) 9%
E) 10%

42 What is the book value of a company car at the end of three years, valued at $18 000 new and having an annual depreciation amount of $1 500?

A) $ 3 000
B) $ 4 500
C) $13 500
D) $16 500
E) $22 500

43 A stereo system for a local clothing store that cost $1 500 when new has an estimated disposal value of $200 after 12 years. Using the declining balance method, what would be the annual percent rate of depreciation? Find your answer to the nearest whole number.

A) 7%
B) 8%
C) 13%
D) 14%
E) 17%

Option II (Cont'd.)

44 Moda Fashions will be renting space for its new store in Portage Place for $30 000. Find the amount of rent allocated to the women's shoes department if it is one of 4 departments in the store and it occupies 11 square metres out of a possible 120 square metres of space.

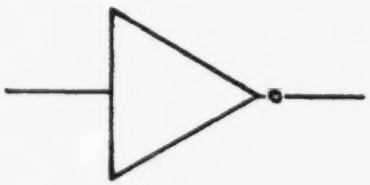
A) $2 500
B) $2 750
C) $3 000
D) $7 250
E) $7 500

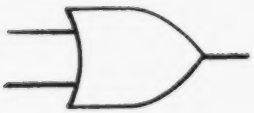
END OF OPTION II

OPTION III - DIGITAL LOGIC

BEGIN THIS OPTION ON SPACE NUMBER 51 OF YOUR ANSWER SHEET.

(51) The symbol for the AND gate is

A) 

B) 

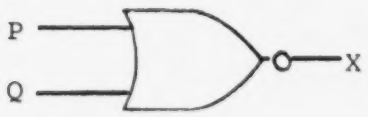
C)

D)

E)

Option III (Cont'd.)

52 Which truth table indicates the output of the following diagram?



A)

P	Q	X
0	0	0
0	1	0
1	0	0
1	1	1

B)

P	Q	X
0	0	0
0	1	1
1	0	1
1	1	1

C)

P	Q	X
0	0	0
0	1	1
1	0	0
1	1	1

D)

P	Q	X
0	0	1
0	1	1
1	0	1
1	1	1

E)

P	Q	X
0	0	1
0	1	0
1	0	0
1	1	0

Option III (Cont'd.)

53 The function of an inverter in a digital device is

A) to switch the input to output and vice-versa.
B) to change a flip-flop into a latch or vice-versa.
C) to change the truth value from false to true or vice-versa.
D) to change a gate into a toggle switch or vice-versa.
E) to change a binary number into a decimal number of vice-versa.

54 The decimal number equivalent to the binary number 1001 is

A) 8
B) 9
C) 10
D) 11
E) 12

END OF OPTION III

OPTION IV - INVESTMENTS

BEGIN THIS OPTION ON SPACE NUMBER 61 OF YOUR ANSWER SHEET.

(61) Using the partial list of the stocks sold on the Toronto Stock Exchange, how many shares of BC Rail can you purchase for $1000? (Ignore commission charges.)

TORONTO

52 Week High	Low	Stock	Div	High	Low	Close	Ch'ge	Vol
120	12	Abatera o		16	14	14	+2	5200
16 3/8	365	Aberford		435	430	430	-10	1751
173	9	Aberford w		15	15	15		4100
185	75	Abermin o		155	150	155		35200
26 3/4	15 1/8	Abti Prce	60	$23 3/4	23 1/2	23 5/8	+1/8	1090
47 1/2	43 1/2	Abitbi 7 1/2p	3.75	$46 1/2	46 1/2	46 1/2		250
6 1/8	350	Abitibi w		410	400	400		1850
7 3/8	100	Aces ATM o		225	225	225		z77
6 3/8	225	Acugrph A o		375	375	375		700
300	35	Acugraph w		100	100	100	+10	1550
6	290	BCED		330	320	325		21970
9 1/4	5 1/8	BCED 8 5/8 y	.86 1/4	$ 9	8 7/8	8 7/8	-1/8	2800
9 7/8	5 1/2	BCED 9 1/2 y	.95	118	115	115	-3	1500
28 3/8	25 3/4	BC Rail p	2.31	$ 27	26 7/8	27	+1/4	1150
26 1/8	19 1/4	BC Sugar A	1.20	$ 21 1/2	21 1/4	21 1/4	-1/4	4900
410	210	BC Sugar w		240	240	240	-11	750
31 1/4	29 7/8	B Corp p	2.36	30 1/4	30 5/8	30 5/8	-1/8	240

A) 35

B) 37

C) 25 750

D) 26 875

E) 27 000

Option IV (Cont'd.)

Use the table below for questions 62 and 63.

Base Rates of Commission for Orders Up to and Including $20 000

a) For shares selling under $14.00, the commission is 2.5% of the value of the order.
b) For shares selling at $14.00, and up to and including $30.00, the commission is 22.575 cents per share plus 0.8875% of the value of the order.
c) For shares selling over $30.00, the commission is 1.64% of the value of the order.

Minimum Commission

Orders under $10.00	Discretion of the broker
Orders of $10 - $50.00	$2.00
Orders over $50.00	$5.00

62 Calculate the commission on the purchase of 100 shares of Inco Ltd. at 18\frac{5}{8}$ per share.

A) $22.58
B) $30.55
C) $39.10
D) $46.56
E) $62.50

63 Calculate the capital gain on Joan's stocks if she purchased 60 shares at $12.25 each and sold them at $14.50 each.

A) -$ 95.35
B) -$135.00
C) $ 95.36
D) $135.00
E) $156.27

64 Calculate the yearly dividend from Nesbitt stocks if they pay 24 cents quarterly and you have 100 shares.

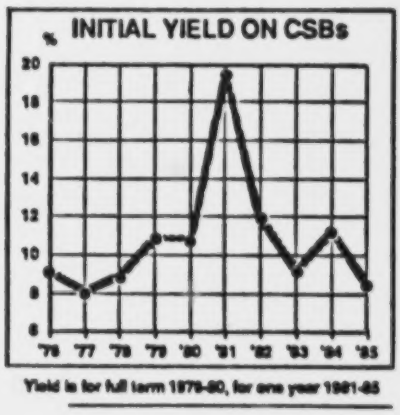
A) $ 24.00
B) $ 50.00
C) $ 72.00
D) $ 96.00
E) $100.00

END OF OPTION IV

OPTION V - INTERPRETATION OF GRAPHS

BEGIN THIS OPTION ON SPACE NUMBER 71 ON YOUR ANSWER SHEET.

71



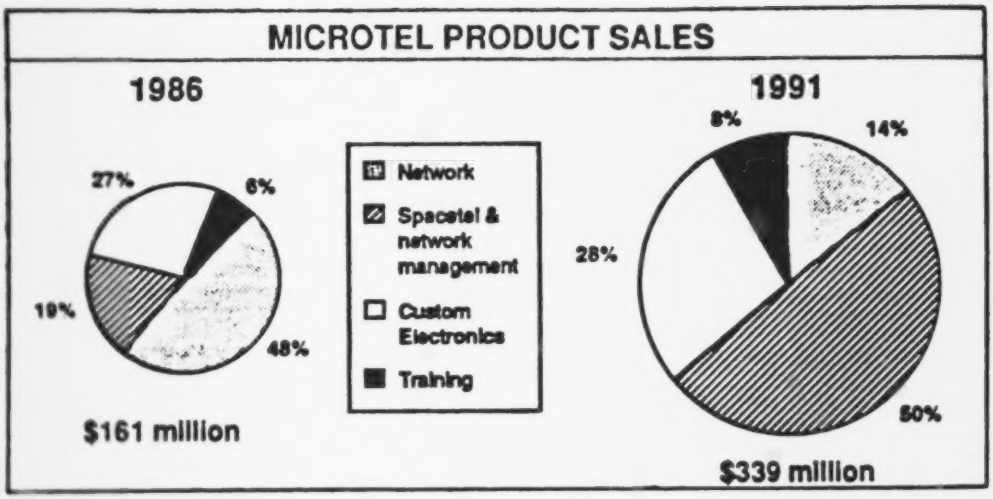
Yield is for full term 1979-80, for one year 1981-85

Between what 2 years did the yield on Canada Savings Bonds (CSB's) increase the greatest?

A) 1980 - 1982
B) 1976 - 1980
C) 1979 - 1980
D) 1981 - 1982
E) 1980 - 1981

Option V (Cont'd.)

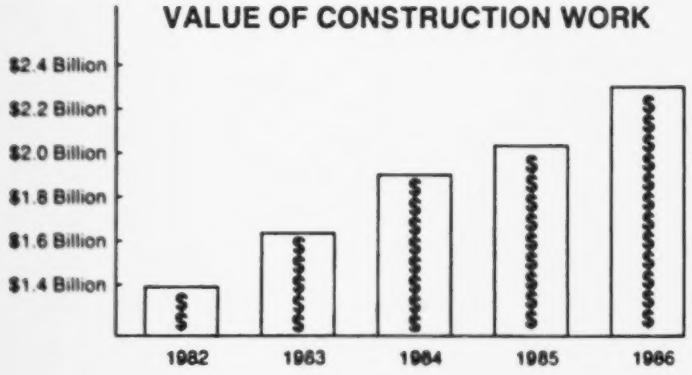
72



What were Microtel's sales in 1986 in the custom electronics area?

A) $30.59 million
B) $43.47 million
C) $47.46 million
D) $77.28 million
E) $94.92 million

73



What is the approximate percent increase in the value of construction work (in Manitoba) from 1982 to 1986?

A) 40%
B) 45%
C) 55%
D) 65%
E) 75%

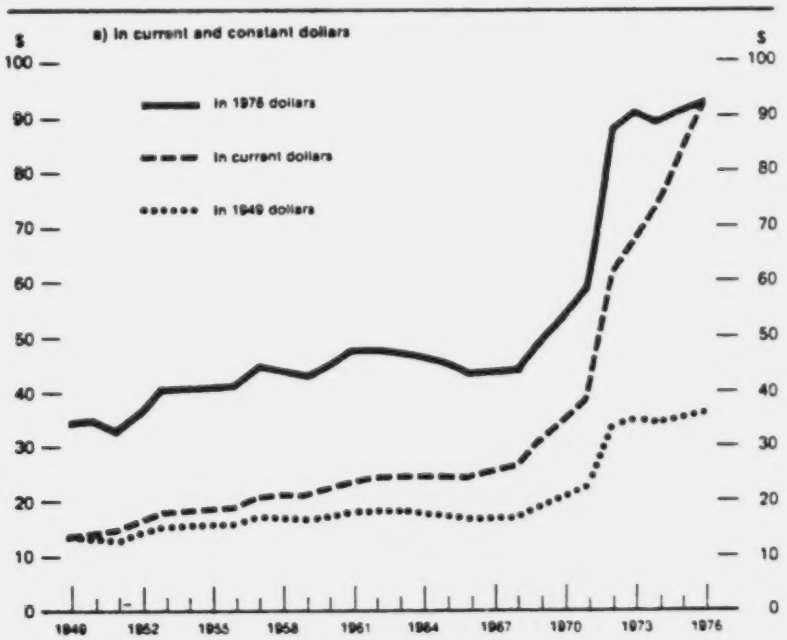
Option V - Cont'd.

74 In 1976 dollars, what were the average weekly unemployment insurance benefits in 1961?

A) About $15
B) About $25
C) About $50
D) About $75
E) About $90

Average Weekly Unemployment Insurance Benefits, Canada, 1949-76

Source: Chart 1.C.-2, Catalogue 86-201, Statistics Canada



END OF OPTION V

OPTION VI - QUADRATIC EQUATIONS

BEGIN THIS OPTION ON SPACE NUMBER 81 OF YOUR ANSWER SHEET.

81 Solve the equation $5x^2 - 245 = 0$

A) 49
B) 7
C) -7
D) 7 and -7
E) no real number solution

82 If you were to solve this equation using the quadratic formula, what values would you use for a, b, and c?

$$4x - 6x^2 = 3$$

A) a = 4, b = -6, c = 3
B) a = -6, b = 4, c = 3
C) a = 6, b = -4, c = 3
D) a = 6, b = -4, c = -3
E) a = 4, b = 6, c = 3

83 Solve the equation $3x^2 - 6x - 5 = 0$. Find the answers to the nearest tenth.

A) 1.3, 0.7
B) 1.7, 0.3
C) 10.8, -8.8
D) 2.6, -0.6
E) no real number solution

Option VI (Cont'd.)

84 Solve for x in the equation

$$3x^2 - 6x - 1 = 0$$

A) $6 \pm 4\sqrt{3}$

B) $\frac{3 \pm 2\sqrt{3}}{3}$

C) $1 \pm 4\sqrt{3}$

D) $\frac{3 \pm \sqrt{6}}{6}$

E) $3 \pm 2\sqrt{3}$

END OF OPTION VI

OPTION VII - PERMUTATIONS AND COMBINATIONS

BEGIN THIS OPTION ON SPACE NUMBER 91 ON YOUR ANSWER SHEET.

91 There are two highways between Banff and Calgary. There are three highways between Calgary and Winnipeg. The number of different routes to drive along these highways from Winnipeg to Banff, via Calgary, is

A) 2
B) 5
C) 6
D) 8
E) 9

92 Simplify $\frac{8!3!}{4!}$

A) 2
B) 6
C) 12
D) 1 680
E) 10 080

93 How many arrangements can be made using the letters of the word PAPPY taken all at a time?

A) 10
B) 20
C) 40
D) 60
E) 120

94 How many committees consisting of 5 people can be chosen from a group of 7 people?

A) 5
B) 21
C) 35
D) 42
E) 2 520

END OF OPTION VII

OPTION VIII - STATISTICS

BEGIN THIS OPTION ON SPACE NUMBER 101 ON YOUR ANSWER SHEET.

(101) Find the variance for Jeannine's term marks of 82, 91, 63, and 76.

A) 8.5
B) 10.2
C) 78
D) 88
E) 103.5

(102) If the variance for a set of data with 8 elements is 24.36, then the standard deviation is

A) 3.0
B) 4.9
C) 9.0
D) 32.4
E) 594.4

Option VIII (Cont'd.)

(103) Using the frequency table below calculate the variance for the fattening period, in days, for 25 pigs.

Class Boundary	x Class Mark	f Frequency	$(x-\bar{x})^2$	$(x-\bar{x})^2 f$
101-105	103	1	324	324
106-110	108	4	169	676
111-115	113	7	64	448
116-120	118	4	9	36
121-125	123	3	4	12
126-130	128	1	49	49
131-135	133	0	144	0
136-140	138	1	289	289
141-145	143	1	484	484
146-150	148	1	729	729
151-155	153	1	1 024	1 024
156-160	158	0	1 369	0
161-165	163	1	1 764	1 764

Mean = $\bar{x}$ = 121

A) 7
B) 15
C) 48
D) 233
E) 449

Option VIII - Cont'd.)

104 Weights of 35 rats were grouped into intervals of 10 grams. Determine the standard deviation from the frequency table below.

Class Boundary	x Class Mark	f Frequency	xf	$(x-\bar{x})^2 f$
370-379	374.5	1	374.5	1098.4
380-389	384.5	2	769	1067.2
390-399	394.5	6	2367	1029.7
400-409	404.5	9	3640.5	86.5
410-419	414.5	11	4559.5	523.7
420-429	424.5	5	2122.5	1428.1
430-439	434.5	1	434.5	723.6
Totals:		35	14 267.5	5957.2

A) 13
B) 20
C) 35
D) 169
E) 408

END OF TEST

MATHEMATICS ASSESSMENT PROGRAM 1987

GRADE 12 MATHEMATICS 301

MANUAL AND SCORING KEY

Note to Mathematics-301 Teachers

This mathematics test includes questions from the 8 option sections of the course (see test, p.17 and page 4 of this Manual). Students are to answer questions from **2 options only.** The mathematics teachers are to designate to their students which 2 options they want them to answer. We suggest that this be done during test administration time before the actual testing begins. It is a good idea to list the 2 option numbers and titles along with item numbers conspicuously on the chalkboard. See item 7, page 2 of this Manual for special coding in this regard.

JUNE, 1987

Manitoba Education

SE 050148

GENERAL INSTRUCTIONS

This test consists of two parts:

PART A - Core - 30 items, written by everyone

PART B - Options - In this part students write only those **TWO** sections designated by the teacher. Each section contains 4 items.

The test requires 75 minutes of writing time to complete. In addition, 10-15 minutes are needed for administration time. There is no break during the test.

1. Please read all instructions carefully before administering the test.
2. Students will respond to all questions on NCS answer sheets.
3. **YOU** must designate the two option sections which students are to write. This should be done before the actual test begins.
4. Detailed instructions for administering the test appear on pages 2 and 3 of the Manual.
5. Students must use pencils for answering questions. Ball point pens must **NOT** be used.
6. Calculators are permitted for all parts of the test. Scratch work may be done in the test booklets. Formulas and tables are provided in the test, where required.
7. There is no penalty for guessing. Students may guess if they are not completely sure of the right answer.

Required Materials

1. Mathematics 301 Manual and Scoring Key
2. Student test booklets
3. Answer sheets
4. Soft lead pencils and erasers (school or student supplied)
5. Calculators and/or math tables (school or student supplied)

ADMINISTERING THE TEST

1. Describe the nature and length of the test and the testing procedure to the students.

2. Remind students that in PART B, they are to write only **TWO** of the option sections. Write the names of these sections on the board.

3. Pass out the answer sheets. Each student should have at least two sharpened pencils and an eraser. There is ample room in the test booklets for scratch work but you may provide scratch paper if you wish.

4. **CODING - NAME AND SEX**
   Pass out the answer sheets. Instruct students to:

   a) Print their names in the boxes provided at the top left corner of side 1. Do not have them blacken the circles underneath the letters.

   b) Blacken the appropriate circles for sex and grade.

5. Instruct students **NOT** to open their test booklets until told to do so. Pass out test booklets.

6. **CODING - BOOKLET NUMBER AND SCHOOL NUMBER**
   a) Each test booklet has a unique 5-digit booklet number. Instruct students to print their test booklet number in the "Identification Number" boxes A-E of the answer sheet and to blacken the appropriate circles.

   b) Each school has a unique 4-digit school code. Your school code is with your testing materials. Instruct students to write this code in the "Special Codes" boxes K-N of the answer sheets and to blacken the appropriate circles.

7. **CODING - OPTION NUMBERS**
   Instruct students to write the Arabic numbers of the two designated options in the "Special Codes" boxes O-P of the student answer sheets and to blacken the appropriate circles. These two selected options are the only two that will be scored for assessment purposes (see p.4 for option numbers).

   Please verify that all coding has been done correctly.

8. Have the students read the "General Instructions" on page 1 of the test booklet. Make certain that students are familiar with the use of the NCS answer sheets.

READ ALOUD

All answers are to be marked on your answer sheet. Blacken the circle that corresponds to your answer. If you wish to change an answer, be sure to erase your first answer completely. Each question has only one correct answer; try your best even if you are not completely sure.

9. Have students turn to page 2 of the test booklet and begin. Note the starting time. (Please check to see that students are on the appropriate part of the answer sheet.)

10. At the end of 75 minutes testing time, instruct students to stop. Collect all test booklets and answer sheets. Place the answer sheets in the envelope provided.

11. Booklets may be retained by the school for future use.

12. Return mailing instructions have been given to principals.

SCORING - MATHEMATICS 301

It is recommended that the tests be scored according to topical subtests because these are more meaningful than a total test score. C refers to topics in the Core, O refers to Options.

Item Number	Correct Answer
C.I Consumer Mathematics	
1	D
2	B
3	A
4	E
5	B
6	B
7	C
8	B
9	A
10	C
C.II Algebra	
11	D
12	C
13	C
14	E
15	B
16	D
17	E
18	C
19	A
20	C
21	A
22	D
C.III Trigonometry	
23	D
24	E
25	D
26	D
C.IV Statistics	
27	C
28	B
29	A
30	C
O.I Annuities	
31	C
32	B
33	C
34	C
O.II Depreciation. . . .	
41	C
42	C
43	D
44	B
O.III Digital Logic	
51	D
52	E
53	C
54	B
O.IV Investments	
61	B
62	C
63	C
64	D
O.V Interpretation of Graph	
71	E
72	B
73	D
74	C
O.VI Quadratic Equations	
81	D
82	C
83	D
84	B
O.VII Perms and Combs	
91	C
92	E
93	B
94	B
O.VIII Statistics	
101	E
102	B
103	D
104	A

MATHEMATICS ASSESSMENT PROGRAM 1987
FINAL TEST SCORES - GRADE 12-301

Subtests and Number of Items per Subtest:

Student Names	CORE				OPTIONS							
	Subtest				O.I	O.II	O.III	O.IV	O.V	O.VI	O.VII	O.VIII
	$C1_{10}$	CII_{12}	$CIII_{4}$	CIV_{4}	4	4	4	4	4	4	4	4